TO DEVELOP A LAND USE-PEAK RUNOFF CLASSIFICATION SYSTEM FOR HIGHWAY ENGINEERING PURPOSES

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16. Abstract

Three cloud-free scenes were obtained on 1 September 1972 B/W transparences and prints received, ClR composites ordered but not received to date. Excellent U-2 and commercial underflight ClR small scale photography obtained. The photography has been studied and photo patterns for a number of land use units have been determined. These data will be used for ground truth for future analyses of ERTS ClR composite imagery. Less than 20% of the budget has been expended because of the delay in receiving imagery, especially color composite products.

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PREFACE

a. Objectives - To devise methods of gleaning hydrological information from satellite imagery useful to highway engineers for the design of drainage structures.

b. Scope - Visual interpretation using various methods of projection and viewing are employed. Electronic and photographic enhancement will be accomplished with at least three available cloud free scenes in the near future.

c. Conclusion - a limited amount of cloud-free black and white satellite imagery has been received to date. A superficial examination of the imagery suggests that the main objectives of this proposal are attainable.

d. Recommendations - less delay in receiving C 1 R composites would expedite the study. U-2 underflight products have been sent with considerably more dispatch. Especially for spring break-up underflight obtained during the period of maximum runoff prompt receipt of products for field checks is highly desirable.

Introduction - This report contains (1) a description of photography and imagery received to date, (2) available ground truth and (3) limited analysis of the products.

1. ERTS - 1 Imagery

a. 14 August - B/W transparencies and prints of two frames, over 50% cloud cover.

b. 15 August - B/W transparencies and prints of three frames, over 50% cloud cover.

c. 1 September - B/W transparencies and prints of three frames cloud free, excellent quality. Simulated color infrared transparencies and prints ordered.

2. U-2 Underflight Photography

a. 27 April, 150 linear miles, over 60% cloud cover, 70 mm CIR transparency.

b. 20 August, four bands Vinten 70 mm transparencies, 500 linear miles, 50% cloud cover.

c. 20 September, four bands Vinten 70 mm transparencies, RC 10 CIR, 500 linear miles, cloud free.

3. Local Commercial Photography

A local concern was chartered to obtain 70 mm vertical stereo coverage, at an approximate scale of 1:125,000 on two separate missions described below.

a. 15 & 16 August, color and CIR, 150 linear miles, cloud free.

b. 20 September, CIR only, Wratten 8, 12 and 15 filters, 150 clear miles, cloud free.

The sites covered in the above flights were within the U-2 corridors.

4. Low Altitude Obliques

Approximately 500 35 mm oblique and near vertical photos were taken

by the writer at select study sites along corridors described in Items 2 and 3 where considerable ground truth has been obtained. Color infrared, color and some panchromatic shots were taken during eight flights at altitudes ranging from a few hundred to 10,000 feet under varying cloud and haze conditions.

5. Ground Truth

Hydrological data for several dozen watersheds located in forested areas ranging in size from 100 acres to 25 square miles have been assembled. Information for study areas in agricultural regions in northern test sites where good ERTS 1 September coverage has been received is being gathered. Similar data is being collected for a number of watersheds located principally in urban environments.

6. Filing

a. Coverage of individual ERTS scenes are filed in separate folders and plotted on 1:1,000,000 scale maps.

b. NASA and Commercial underflight photography described in Items 2 and 3 are filed by flight line in protective transparent envelopes and plotted on 1:250,000 USGS topographic maps.

c. Low altitude 35 mm views are cross referenced to satellite and underflight imagery.

7. Work performed

Black and white satellite transparencies and prints received in late October have been examined. Simulated color infrared transparencies and prints of several select frames have been ordered but not received to date. U-2 photography taken on 20 August and 20 September was received in November, and analysis or comparison of the type of information relating to the identification of various land use types and different water storage categories by visual methods has been initiated. A Bausch and Lomb Zoom Stereoscope and projectors are being

employed. Experimental photographic enlargements to a scale of 1:250,000 of several positive transparencies and negatives have been made.

Contact has been made with the General Electric GEMS facility concerning the possibility of electronic and computer data processing and enhancement of one or more of the three cloud-free available scenes.

8. Program for the Next Reporting Interval

An evaluation will be made of all imagery and photography described in the previous paragraphs. Hopefully at least one, and perhaps two, U-2 underflight will be obtained concurrent with ERTS orbits during crutical spring high water periods amd during the early stages of deciduous foliage development. To date less than 20% of time allotted to the study has been expended because of the delay in receiving imagery and especially color composite products which are deemed to be highly important for this study.

9. Conclusions

Bands 6 and 7 are excellent for the detection of surficial water and swampy sites having the water table at or near the ground surface. Water bodies less than five acres in extent have been identified. Color composites should provide considerably more data for visual analysis than the B/W products currently available to this investigation. It is felt that the major objectives of the proposals can probably be achieved.